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NATHAN S. LEWIS

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 09/409,644  
Filing Date: October 01, 1999  
Appellant(s): LEWIS ET AL.

**MAILED**  
**MAR 19 2007**  
**GROUP 1700**

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Joseph R. Baker, Jr.  
For Appellant

**SUBSTITUTE EXAMINER'S ANSWER**

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This is in response to the appeal brief filed November 13, 2006 and is a substitute for the Examiner's Answer mailed July 22, 2005. It has incorporated changes in the descriptions of the Naarmann and Sakaguchi references in light of the translations of those references sent to Appellant in the letter mailed January 9, 2007. It also includes some changes to the description of the Mifsud references to clearly state that the US patent is being used by examiner as an English language equivalent or translation of the WO document.

**(1) *Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

**(2) *Related Appeals and Interferences***

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

**(3) *Status of Claims***

The statement of the status of the claims contained in the brief is correct.

**(4) *Status of Amendments After Final***

The Appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) *Summary of Claimed Subject Matter***

The summary of claimed subject matter contained in the brief is correct.

**(6) *Grounds of Rejection to be Reviewed on Appeal***

The Appellant's statement of the grounds of rejection to be reviewed on appeal in the brief is substantially correct. The changes are as follows: a new ground of rejection has been added and one ground of rejection has been withdrawn by examiner.

**NEW GROUND(S) OF REJECTION**

The new ground of rejection concerns obviousness-type double patenting with a patent.

**WITHDRAWN REJECTIONS**

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner. The rejection of claim 158 under 35 U.S.C. 112 second paragraph. It is also noted that the explanation of the de Lacy Costello reference has been

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withdrawn from the explanation below since it appears to have been inadvertently left in the explanation at the time of the final rejection.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

WO 96/07901 Gibson et al. (Gibson) March 14, 1996  
Barisci et al. (Barisci) Trends in Polymer Science 1996, 9, 307-311.  
Casella et al. (Casella) Analytica Chimica Acta 1996, 335, 217-225.  
Thackeray et al. (Thackeray) Journal of Physical Chemistry 1986, 90, 6674-6679.  
Yamato et al. (Yamato) Synthetic Metals 1997, 87, 231-236.  
DE 3728452 A1 Naarmann et al. (Naarmann) March 9, 1989  
Li et al. (Li) Materials Research Society Symposium Proceedings, 1995, 369, 581-585.  
JP 4-2958 Sakaguchi et al. (Sakaguchi) January 7, 1992  
US 5,512,882 Stetter et al. (Stetter) April 30, 1996  
Wampler et al. (Wampler) J. Mater. Res. 1995, 10, 1811-1822.  
Breheret et al. (Breheret) Bioflavor 1995, 75, 103-107.  
US 5,801,297 Mifsud et al. (Mifsud) September 1, 1998  
WO 95/08113 Mifsud et al. (Mifsud) March 23, 1995 (US 5,801,297 is an English language equivalent/translation and was treated as such by examiner)  
Moy et al. (Moy) Bioflavor 1995, 75, 55-58.  
WO 86/01599 Persaud et al. (Persaud) March 13, 1986  
US 6,631,333 Lewis et al. (Lewis) October 7, 2003

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 98-110, 112-113, 115, 117-123, 126-135, 137, 139-157 and 159 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibson in view of Barisci (Trends in Polymer Science, 1996) and Casella, Thackeray, Yamato, Naarmann (DE 3,728,452), Li (Materials Research Society Symposium Proceedings, 1995), Sakaguchi (JP 4-2958), Stetter (US

5,512,882) or Wampler. In the patent application Gibson teaches an odor sensor. Page 1 teaches that sensors are important for a variety of applications including food freshness, headspace analysis and detection and quantification of bacteria (micro-organisms). The page also teaches that the a personnel recognition sensor described includes a multiplicity of differentially responding chemo-resistor elements (a plurality or an array of sensors); a detector responsive to signals provided by the multiplicity of elements and arranged to provide an output signal characteristic of the multiplicity of signals; and a housing with the elements disposed therein having an inlet arranged so that a gaseous sample passing into or through the inlet contacts all of the elements in use (see each of the independent claims). Each element has a non-conductive substrate, a plurality of electrodes disposed on the substrate and one or more layers of a conductive polymer overlaying the electrodes, with the conductive polymers of at least two of the elements being different. The page also teaches that the sensors have been prepared on interdigitated gold electrodes (page 5) by polymerizing a number of monomers using chemical or electrochemical techniques; the polymers produced are electrically conducting and have varying sensitivities to volatile odor compounds; and the interaction between an odor compound and a conducting polymer is detected by a change in the electronic characteristics particularly the **resistance, impedance, reactance or capacitance** (instant claims 115,134,137,157) of the polymer film, which may be indirectly measured using changes in the applied potential or current. Page 2 teaches that the sensor may also include a memory (instant claim 150) adapted to store a library of odor profiles characteristic of particular individuals and means for comparison of the odor profile constituted by the multiplicity of signals from the sensor elements with an odor profile contained in said library. Standard pattern recognition techniques or a neural network (instant claims 147,149,152-153) may be adapted to retain characteristic features of the multiplicity of signals for incorporation into the library. The paragraph bridging pages 2-3 teaches that the conductive polymers may be selected from the following group: perimidine, polybenzene, polyphenylenesulphide, polyacetylene, **polyaniline**, polyphenylenediamine, **polypyrrole**, **polythiophene**, polyindole, polyimidazole, polythiazole, polybithiophene, polyphthalocyanine, polytryptophan and copolymers thereof. The following paragraph on page 3 teaches that a wide range of dopants may be employed including: nitrate, perchlorate, chloride, bromide, fluoride, sulphate, dodecyl and other alkyl sulphates, sulphonate, alkyl sulphonate, aryl

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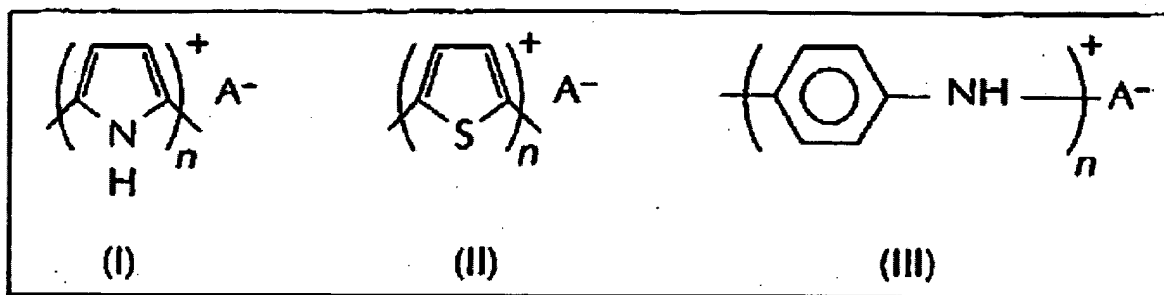
sulphonate, fluoroborate, borate, phosphate, carbonate, iodide, ferricyanide; ferrocyanide; alkyl carboxylic acids (octanoic acid, acetic acid, etc), chromate, thiosulphate, sulphite, silicates and vanadate. Page 6 teaches that chemical polymerization may be carried out using suitable oxidizing agents such as sodium persulphate, sodium periodate, ferric nitrate, ferric perchlorate and the like added to a solution of the monomer deposited onto the upper surface of the cleared transducer. The polymeric material is formed as an insoluble layer and the upper surface of the interdigitated area covers the whole active surface of the transducer. Page 6 also teaches that electrochemical polymerization may be achieved by incorporating the interdigitated transducer into an electrochemical circuit as the anode or cathode dependent on the polymer species to be formed. Anodic deposition, the most common technique, is carried out by immersion of the transducer in a monomer solution with a platinum counter-electrode adjacent the surface and a reference electrode (silver/silver chloride or calomel) connected into the circuit via a salt bridge. The system may then be either maintained at constant potential or alternatively the potential may be cycled between two predetermined values to allow formation of the polymer film on the transducer surface. Examples on pages 11-13 illustrate the electrochemical polymerization process for poly-1,4-phenylenediamine, polyimidazole, polyquinoline, poly-N-phenyl-1,4-phenylenediamine, and a co-polymer of pyrrole and 1-methylpyrrole. The first full paragraph of page 13 teaches that polymers prepared using similar techniques include: **polypyrroles**, **polythiophenes**, polyindoles, polyphthalocyanines, **polyanilines**, polycarbazoles, polythionine, polyaminonaphthalenes, polyaminoanthracenes, polyphenylenediamines, polyaminophenols, polynaphthyl(ethylenediamine), polyimidazoles, polyquinolines, polytryptophan, polyhetero cycles, polyaminohetero cycles and substituted derivatives of the above compounds. The same paragraph also teaches that **copolymers and blends of the above compounds may be employed**. The listed polymers may be treated with various ionic dopant molecules, as outlined above, incorporated into the conducting films during and post polymerization. The last full paragraph of page 13 teaches that the array includes between 3 to several hundred sensors. Multiple arrays may incorporate 16 and 32 sensors and may be arranged to operate from either a constant current or constant voltage power supply. The sensor array may be disposed in the housing adapted to allow flow of a gaseous sample over each of the sensor elements. A gaseous sample may be simply injected into the space above the array. Alternatively a piston, bellows or

other pump arrangement may be employed. Figure 1 and its description on pages 14-15 present the response of a 16 sensor array to two samples of odor from a subject collected in a syringe and blown across the array. The sensor elements that make up the array include the following polymers and dopants: 1) poly-n-ethylaniline with  $\text{SO}_4$  counter ion; 2-3) poly-aniline with  $\text{SO}_4$  counter ion; 4-5) poly-tryptophan with  $\text{SO}_4$  counter ion; 6) poly-2-methoxy-5-nitroaniline with  $\text{SO}_4$  counter ion; 7) thiophene/thiophene-3-carboxylic acid copolymer with tetrabutylammonium perchlorate counter ion; 8) poly-aniline with ethanol and with  $\text{SO}_4$  counter ion; 9) poly-pyrrole with octanoic acid ethyl ester dopant; 10) poly-pyrrole with an upper layer of poly-tryptophan with octanoic acid ethyl ester dopant and with  $\text{ClO}_4$  counter ion; 11-12) poly-1,4-phenylenediamine with  $\text{Cl}$  counter ion; 13) poly-pyrrole with  $\text{Cl}$  counter ion; 14) poly-pyrrole with tetrabutylammonium perchlorate counter ion; 15) pyrrole/1-methyl pyrrole copolymer with  $\text{NO}_3$  counter ion; and 16) poly-pyrrole with octanoic acid ethyl ester dopant. Figures 3-4 show alternative configurations of the interdigitated electrodes. Pages 3-4 describe a second array of sensors including a different set of polymers that is intended for food analysis and quality control identification of bacterial infection, prediction of oestrus in livestock and environmental monitoring (instant claim 148). Page 16 describes a system for measuring the response of a 16 sensor array to compounds using a setup to sample the headspace above a liquid sample. This system uses a personal computer and dedicated software to acquire and process the resistance data. Gibson does elaborate on what constitutes a blend of the polymer compounds listed on page 13 and how the blend is different from the copolymers listed in the same sentence. Gibson also does not teach blends or mixtures of the listed conductive polymers with inorganic conductors (metal particles, metal oxides, etc.), organic conductors (carbon black, charge transfer complexes, etc.) and mixed inorganic/organic conductors claimed in which the two conductive materials are mixed together to form as a single sensing material having the compositionally different conductive material within the conductive organic material.

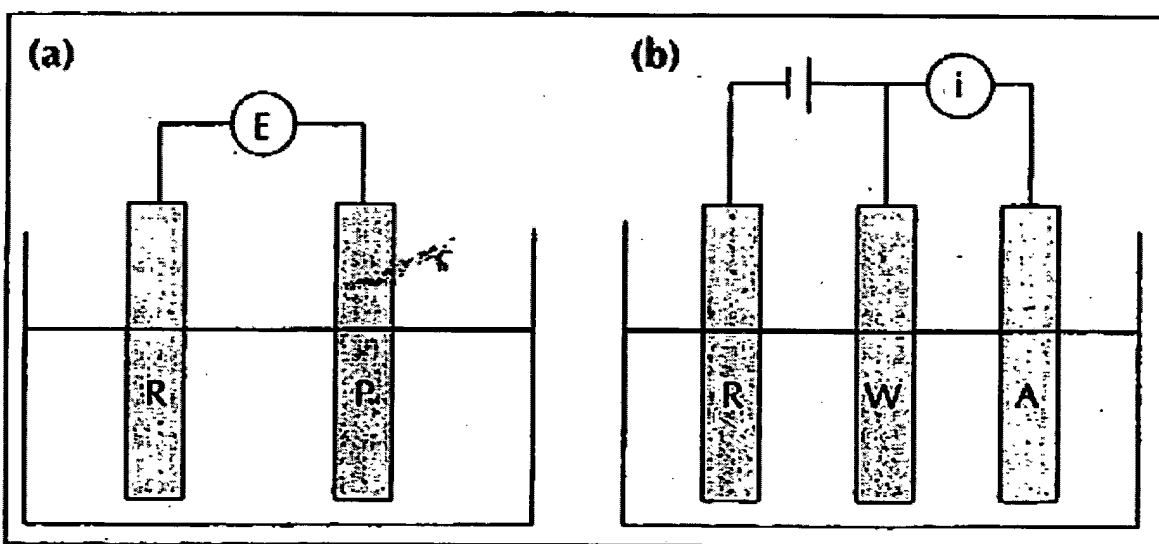
In the paper Barisci gives a review of conducting polymer sensors. The review examines recent advances in the application of electrically conducting polymers in sensing devices. Figures 1-2 and 4, reproduced below, show some representative conducting polymer and setups for different measurement methods found in the references applied against the claims. In 2(b) the working electrode is separated from the other two electrodes by the polymer layer so that in

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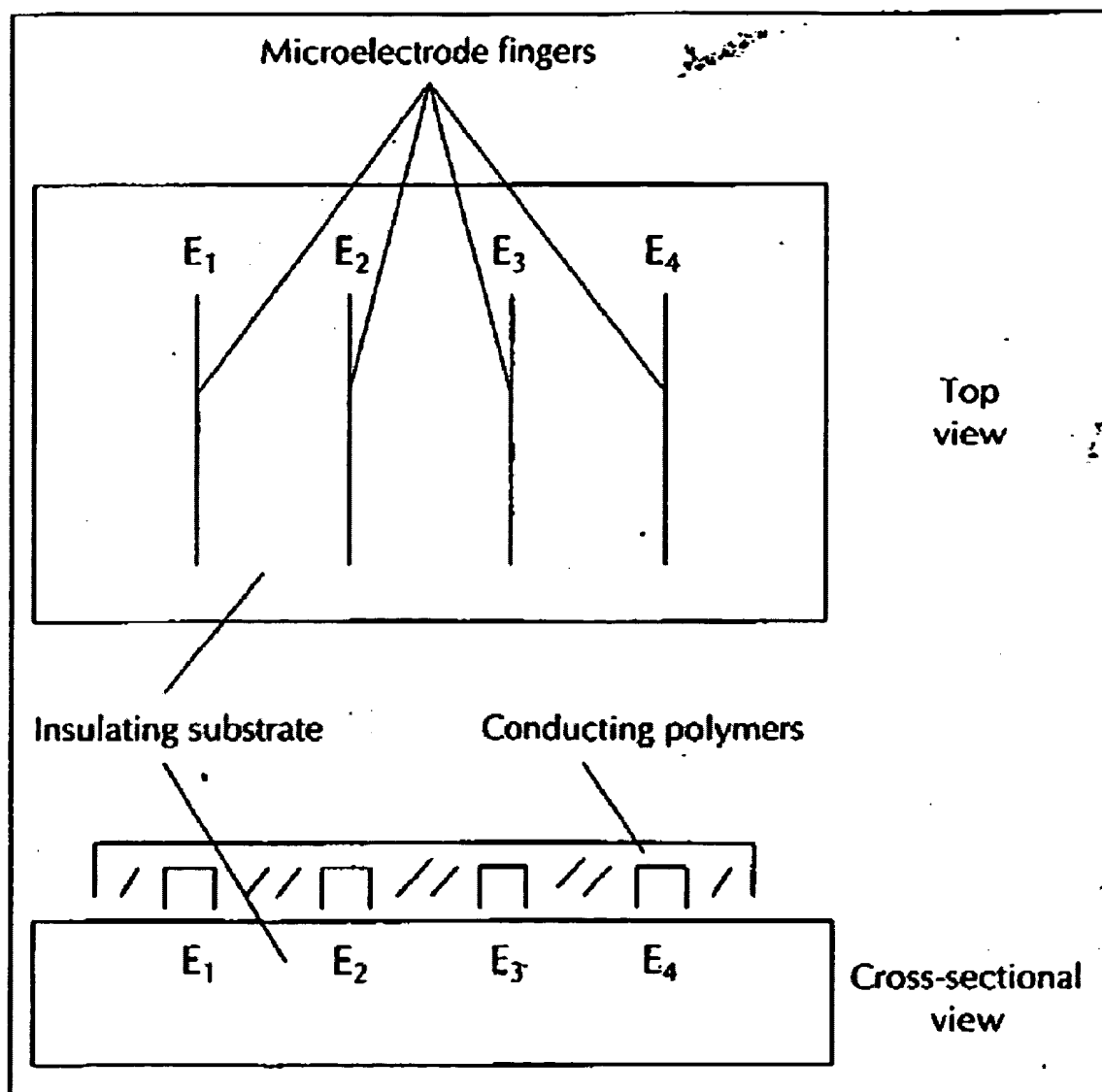
all instances the potential, current or resistance being measured is measured through the conducting polymer layer. The second paragraph of the article on page 307 teaches that the discovery of conductive electroactive polymers shown in figure 1 heralded a new era in electrochemical research because the materials are inherently conducting, an unusual property for a polymer. In the course of numerous studies it has become obvious that the electrical properties of these new materials are very dependent on their chemical composition and on the chemical environment to which they are exposed. This susceptibility to the chemical environment provides the basis for the use of these materials in new sensing technologies.



**Fig. 1** Idealized structures of some common conducting electroactive polymers: polypyrroles (I), polythiophenes (II) and polyanilines (III) ( $A^-$ , counterion).



**Fig. 2** (a) Setup for potentiometric measurement techniques: E, potential-measuring device; R, reference electrode; and P, polymer electrode. (b) Setup for current-measuring techniques: i, current-measuring device; A, auxiliary electrode; W, working electrode; and R, reference electrode.



**Fig. 4** Microelectrode array for resistance measurements. Current is passed between  $E_1$  and  $E_4$ , and the voltage drop between  $E_2$  and  $E_3$  is measured. This voltage is used to calculate the resistance.

Methods of signal generation, mainly electrical and electrochemical, are discussed, as are strategies for introducing into the polymer structure appropriate analyte recognition characteristics. The use of conducting polymers in gas sensors and in solution sensors for detection of chemical and biochemical species was reviewed with some conclusions. Relative to the methods of signal generation, page 307 teaches that the polymers can produce signal through

potentiometric, current-measuring and conductometric/resistometric methods (see figures 2 and 4 above). The current-measuring methods (pages 307-308) are taught as including 3 or 4 ways that an analyte can interact with the conductive polymer (e.g. polypyrroles, polythiophenes and polyanilines) to modify the current flow as a function of the applied potential. Particularly relevant to the instant invention is the fact that the current measuring section on page 307 points to the conductometric/resistometric section (page 308) for one way that the current flow can be modified through interaction of an analyte and the conducting polymer. Further it is clear from the discussion of both sections that the current flow can be affected by the interaction of the analyte with the polymer or its counter ion (see the second full paragraph of the right column of page 308 and in particular the last sentence of the paragraph). Thus there is a connection between the different signal generation methods and the interaction of the analyte with the polymer that would have been recognized by one of skill in the art. In other words one of ordinary skill in the art would have recognized that changes affecting the current flow would have been expected to provide a measurable signal in both the current measuring and conductometric/resistometric methods. In the solution sensor section, amperometric detection is discussed. Relevant to the instant claims is the second full paragraph of that section on page 308. This paragraph teaches that amperometric detection is based on the changes in current flow caused by oxidation/reduction of the polymer. This paragraph also teaches that the selectivity to a particular anion or anions is influenced by counter anion incorporated into the polymer. The response observed is due to the inclusion/expulsion of cations present in solution as the polymer is reduced or oxidized. The first full paragraph of page 309 discusses the use of overoxidized polypyrrole, known to be less conductive (more resistive), as analytical sensor with sufficient signal to function as a sensor. This section also points to changes in a current measuring setup (amperometric) causing changes that would have been recognized as being measurable by the conductometric/resistometric methods. In the gas sensor section of the paper both electronic interactions with the polymer and swelling of the polymer by the analyte are discussed as the basis for the measurable changes in the current flow in the polymers. In the second full paragraph of the gas sensor section on page 310, the gas sensing properties of polypyrrole are discussed with the sensitivity of the polymer to different gases ( $\text{NO}_2$  and  $\text{H}_2\text{S}$ ) being based on their oxidizing or reducing the polymer. **The signal results from the associated change in the**

**resistance of the polymer.** This clearly shows a connection between the oxidation/reduction (redox) state of the polymers and the resistance level of the polymer and a corresponding expectation that changes causing signals with for a measurement method of the current measuring type **also causing a measurable change in the resistance of the polymer!** Page 310 also discusses the use of different pattern recognition methods when arrays of the sensors are used (see right column). In the first paragraph of page 311, a discussion of composite materials in which the conducting polymer is combined with another material. These composite materials showed improved reproducibility when used as sensors, adequately compensating for any problems due to an expected lower sensitivity. The third and fourth paragraphs of the same page discuss the versatility of these conducting polymers and the fact that the molecular structure of these materials influences their electrical properties and enables their interaction with a wide variety of chemical species leading to useful applications in solution and vapor phase sensing.

In the paper Casella discusses copper dispersed into polyaniline films (represents the inorganic conductor/organic conducting polymer combination) as an amperometric sensor in alkaline solutions of amino acids and polyhydric compounds. As a chemically modified electrode composed of copper microparticles dispersed into as a polyaniline (PANI) film was studied as an amperometric sensor of scanty electroactive compounds possessing -OH and -NH<sub>2</sub> groups. Glassy carbon was used as an electrode material and modified firstly by a PANI film, then allowed to stand in contact with a solution of copper ions, and finally, the electroreduction was done at -0.3V. Pages 218-219 teach two forms of the electrode setup with the flow cell (page 219) being a particularly relevant structure since the liquid flows through the cell, contacting all three electrodes. Page 220 in the sentence which bridges the two columns teaches that about 12% of the deposited copper was dispersed (able to penetrate) in the polymer matrix. The electrochemical behavior of the resulting modified electrode in alkaline medium was examined by cyclic voltammetry and flow-injection amperometry. Using some representative compounds, the effect of copper loading and pH on the electrode response was studied. Constant-potential amperometric detection was applied in conjunction with anion-exchange chromatography (AEC) separations of amino acids and carbohydrates. At an applied potential of 0.55 V vs. Ag/AgCl, the detection limits (S/N = 3) for all analytes studied ranged 5-15 pmol, and the linear dynamic range was three-four orders of magnitude above the detection limits. The

resulting modified electrode was found to retain 95% of its initial response in flowing streams for 3 hours of operating time. From the title at least it is clear that the copper particles are dispersed **into** the polyaniline films.

In the paper Thackeray teaches chemically responsive microelectrochemical devices based on platinized poly(3-methylthiophene) (represents the inorganic conductor/organic conducting polymer combination) and shows variation in conductivity with variation in hydrogen, oxygen, or pH in aqueous solution. Microelectrochemical transistors can be prepared by connecting 2 closely spaced ( $\sim 1.2 \mu\text{m}$ ) Au microelectrodes ( $0.1 \mu\text{m}$  thick  $\times$   $2.4 \mu\text{m}$  wide  $\times$   $50 \mu\text{m}$  long) with anodically grown poly(3-methylthiophene). The amount of poly(3-methylthiophene) used involves about  $10^{-7}$ - $10^{-6}$  mol of monomer/ $\text{cm}^2$ . Poly(3-methylthiophene) can be platinized by electrochemical reduction of  $\text{PtCl}_4^{2-}$  at the pair of coated electrodes. The change in conductivity of poly(3-methylthiophene) with change in redox potential is the basis for amplification of electrical or chemical signals; the conductivity varies by 5-6 orders of magnitude upon change in potential from +0.2 (insulating) to +0.7 (conducting) V vs. SCE in aqueous electrolyte. The Pt equilibrates poly(3-methylthiophene) with the  $\text{O}_2/\text{H}_2\text{O}$  or  $\text{H}_2\text{O}/\text{H}_2$  redox couples. [Poly(3-methylthiophene)/Pt]-based transistors are shown to be **viable room-temperature sensors** for  $\text{O}_2$  and  $\text{H}_2$  in aqueous solution. The  $\text{O}_2$  reproducibly turns on the device, with 1 atmosphere of  $\text{O}_2/0.1 \text{ M HClO}_4/\text{H}_2\text{O}$  showing 0.7-mA  $I_D$  at a  $V_D = 0.2 \text{ V}$ ;  $\text{H}_2$  reproducibly turns off the device, with 1 atmosphere of  $\text{H}_2/0.1 \text{ M HClO}_4/\text{H}_2\text{O}$  showing less than 20-nA  $I_D$  at a  $V_D = 0.2 \text{ V}$ , where  $V_D$  (drain potential) is the applied potential between the 2 Au microelectrodes and  $I_D$  (drain current) is the current that passes between the 2 microelectrodes. The turn on with  $\text{O}_2$  is complete within 2 minutes, and the turn off with  $\text{H}_2$  is complete within 0.3 minutes. A platinized microelectrode of a dimension similar to the microelectrochemical transistor shows only 1.0-nA reduction current upon exposure to 1 atmosphere of  $\text{O}_2$ ; the current amplification of the transistor is thus a factor greater than  $10^5$ . The transistor device can also reproducibly respond to pH changes in the pH range of 0-12, when there is a constant  $\text{O}_2$  concentration; there is a reproducible change in  $I_D$  to alternate flow of a pH 5.5/pH 6.5 stream for over 10 h. The device responds to an injection of  $10^{-6} \text{ L}$  of 0.1 M  $\text{HClO}_4$  into an effluent stream of 0.1 M  $\text{NaClO}_4$  (flowing at 2 mL/min) within 4s. Study of the resistance properties of [poly(3-methylthiophene)/Pt] vs. potential reveals that Pt has little effect on the intrinsic conductivity of

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poly(3-methylthiophene). Rather, the role of Pt is purely as a catalyst to allow equilibration of  $O_2$  and  $H_2$  with the polymer. The amount of Pt used is approximately  $10^{-7}$  mol/cm<sup>2</sup>, and microscopy shows Pt to be present as a particle of less than 0.1- $\mu$ m size.

In the paper Yamato presents a new method for dispersing palladium microparticles in conducting polymer films (represents the inorganic conductor/organic conducting polymer combination) and its application to biosensors. Page 232 teaches the electrochemical measurements performed in a three electrode cell into which the glucose was injected. Composite films of polypyrrole/sulfated poly( $\beta$ -hydroxyethers) (PPy/S-PHE) are electrically conducting and mechanically flexible. Palladium particles were dispersed in the films by thermally decomposing bis(dibenzylideneacetone)palladium(0) complex which had been absorbed by the films from a  $CHCl_3$  solution. This method for loading metal particles was enabled by the high affinity of the composite films for organic compounds. TEM and energy-dispersive x-ray spectrometry (EDX) analyses revealed that fine palladium particles in the nanometer range are dispersed in the PPy/S-PHE conducting films. A glucose sensor based on the detection of hydrogen peroxide was prepared by immobilizing glucose oxidase (GOD) using glutaraldehyde on a Pd/PPy/S-PHE electrode. This biosensor responded to glucose even at 400 mV vs. Ag/AgCl, which is lower than the working potential of conventional glucose sensors prepared on a platinum electrode.

In the published application Naarmann teaches manufacture and use of electrically conductive polymers of five-membered heterocyclic compounds and anions of tetrathiafulvalene derivatives (represents the organic conductor/organic conducting polymer combination, see table 2, page 28 of the instant specification). The polymers are prepared by electrochemical oxidative polymerization of 5-membered heterocyclic compound(s) in the presence of conducting salts containing anions of tetrathiafulvalene derivatives. The last paragraph of page 3 of the translation teaches that the object of the invention was to disclose polymers from the class of 5-member ring heterocycles that, in addition to high electrical conductivity and a high mechanical level, also possess additional valuable properties. Pages 4-5 of the translation list several pyrroles and thiophenes and possible copolymerizable compounds for use on the invention. Pages 6-7 of the translation gives the structure of the tetrathiafulvalene compounds used. The first paragraph of page 10 of the translation teaches that the polymers contain tetrathiafulvalene

firmly incorporated in the system, are particularly stable to the effects of water and oxygen and are suited to be used in sensors or as battery electrodes. Derivatives of tetrathiafulvalene were synthesized in examples 1-2. A solution of 1 part pyrrole and 1 part  $\text{NH}_4$  salt of 3,6-di-sulfobenzyloxy-1,2,4,5-benzo-bis(11,11',12,12'-dibenzotetrathiafulvalene) in 100 parts MeCN was electropolymerized by using Pt electrodes in example 3. The obtained polymer film had an electrical conductivity of 80 S/cm and showed a superior stability in a 1-week storage in water compared to a  $\text{ClO}_4^-$ -containing polypyrrole film (page 14 of the translation).

In the paper Li teaches the preparation and characterization of polyaniline-palladium composite films (represents the inorganic conductor/organic conducting polymer combination). Electrosynthesized polyaniline (PANi) can be chemically functionalized by incorporation of palladium clusters. The functionalization of electrochemically, freshly prepared and dried PANi film occurs spontaneously during the relaxation process. This process is carried out in sulfuric acid containing palladium salt. The material properties of the new composite PANi-Pd film were investigated by applying electrochemical, UV-visible spectroscopic and surface microscopy techniques. The PANi-Pd composite materials behaved electrochemically different than PANi film alone or Pd film deposited electrochemically. This finding is **particularly important for developing layers for chemical gas sensors**, electrocatalysis or supercapacitors applications. Page 581 discusses the emeraldine (conducting) form of polyaniline.

In the published application Sakaguchi teaches electrodes for gas sensors (sulfur dioxide or carbon monoxide, page 2 of the translation). The electrodes consist of a composite of a resin compound, a conductive resin compound, and optionally an organic metal complex compound. Preferably, a conductive resin compound is manufactured by chemical oxidation polymerization or electrolytic polymerization. The gas sensors are useful for detection of gas components in exhaust gases and combustion waste gases, and have long life. From the attached Chemical Abstracts abstract it is clear that at least polypyrrole is disclosed as a conductive resin polyvinyl chloride is disclosed (an insulator, see claim 101) and cobalt phthalocyanine are disclosed (represents the organic conductor/organic conducting polymer combination). The JPO abstract teaches iron or platinum complexes with phthalocyanine and naphthalocyanine also being used. Page 5 of the translation lists several possible resins in the second full paragraph and several metal organic complexes in the last paragraph. The first paragraph of page 7 of the translation

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gives a more complete listing of the gases to be sensed. The paragraph bridging pages 9-10 of the translation gives a more complete listing of the possible electropolymerizable compounds. The examples show the different ways of making the electrodes and their use in sensing gases. The last page of the translation lists the various benefits of the electrode structure taught including stability (last a long time without catalyst loss), good selectivity and detection sensitivity and reduced weight in combination with excellent moldability.

In the patent Stetter teaches a chemical sensing apparatus for the detection of a vapor of a selected chemical substance includes a sensor whose impedance changes upon exposure to such a vapor. The sensor comprises a polymer whose physical structure is altered by the vapor, e.g., through expansion or disintegration, and electrically conductive elements that are interspersed with or separated by the polymer. The interspersed elements may consist of a fine powder of carbon or of a metal in a matrix of silicone or other vapor-sensitive polymer. The electrical contacts between the powder particles are weakened when the polymer swells or disintegrates, which results in increased resistance. Alternatively, the capacitance between two conductive layers separated by a polymer layer decreases, and hence the impedance increases, when the polymer swells upon exposure to the vapor. In the paragraph bridging columns 2-3 Stetter teaches that the particles are conductive and include carbon powder (carbon black), copper, silver, gold, platinum or other suitable metal. This patent shows alternative forms of inorganic conductors. The patent discusses how the conductivity can be affected by either the polymer swelling or being degraded due to the interaction of the analyte with the polymer.

In the paper Wampler discusses the chemical synthesis and characterization of composites of polypyrrole and carbon black. A new class of molecular composites of carbon black and an electronically conducting polypyrrole has been synthesized by chemically polymerizing pyrrole in an aqueous dispersion of carbon black. The carbon black content of these composites can be varied from ~5% to ~85% (by weight). The surface areas and densities of these composites were compared to corresponding mixtures of carbon black and polypyrrole. The influence of carbon black on the efficiency of polymerization of pyrrole is described. The effect of carbon black content on the electronic conductivity of the composite has been mapped, and compared with the corresponding behavior of a mixture of carbon black and poly(vinyl chloride). The influence of the parent black characteristics (porosity, void vol., surface area) on

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the electronic conductivity of the resultant composite has been probed by comparing the behavior of composites derived from six commercial and experimental blacks. The temperature dependence of the composites has been studied as a function of the carbon black content. The application of these new materials is examined. The first page of the paper teaches that the potential applications include sensors, electrocatalysis, super capacitors and fuel cells. In the sentence bridging pages 1811-1812 Wampler teaches that other similar composites of conducting polymers with polymers, metals, or metal oxides has extended the scope of their use. The paper clearly shows that the composite is superior to either component of the composite when applied to the electrocatalysis of chromium(VI) to chromium(III).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi, Stetter or Wampler relative to the incorporation of conductors such as carbon black, anions of tetrathiafulvalene derivatives, metal particles or metal oxide into the conductive organic polymers used in the sensing arrays of Gibson because of their sensitivity to known analyte gases or enhanced sensing and/or stability properties as taught by each of Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi or Wampler compared to sensors made with only the conductive polymers taught by Gibson and the recognized ability and expectation of the Gibson conductive polymers to be affected by interactions in a number of sensing formats in a manner that changes the electronic structure and as a result the resistivity of the polymer as shown by Barisci.

Claims 114, 116, 136, 138 and 158 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibson in view of Barisci and Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi, Stetter or Wampler as applied to claims 108, 113, 115, 128, 135, 137 or 152 above, and further in view of Breheret, Mifsud (both US 5,801,297 and WO 95/08113), Moy or Persaud (WO 86/01599). Gibson does not teach a temperature control apparatus in thermal communication with at least one sensor or a sensing array having sensors that are not organic polymer based.

In the paper Breheret presents online differentiation of mushrooms aromas by combined headspace/multi-odor gas sensors devices. A specially designed measurement cell for direct headspace analysis, online connected to (I) a gas chromatograph equipped with an headspace

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injector and a sniffing-port, (ii) multisensors devices: five semiconductor gas sensors and twenty conducting polymer gas sensors, was used to discriminate nine mushrooms' aromas. The raw data of gas sensors were statistically processed, and provided pictorial presentation under sample distribution in a plan, allowing comparison the different mushrooms' aromas, with the GC/sniffing analysis. Semiconductor gas sensors succeeded in classifying four groups based on overall odor. Semiconductor gas sensors seem to be more appropriate for the mushrooms aromas discrimination than conducting polymer gas sensors. These preliminary results confirm the interest of such technologies for chemotaxonomy differentiation of wild mushrooms. Page 104 in the discussion of semiconductor gas sensors teaches that a control unit providing a constant potential to the sensor circuit voltage and a variable potential to the heater circuit is used (a temperature controller is used).

The US Patent is the result of a national stage application resulting from the published patent application and constitutes an English language equivalent/translation of the Mifsud application. Thus examiner has used the US Patent as a translation of the published application in addition to a reference. In the patent and published application Mifsud teaches methods and devices for the detection of odorous substances and applications. A device for carrying out a method of odor detection including, in particular, a plurality of chambers, each having a plurality of semi-conductor gas sensors, conductive polymer gas sensors, surface acoustic wave gas sensors, as detection means, a variable flow gas pump for forming a gas flow in said chambers, measurement electronic device for operating the detection means, a data processing unit for recording in a file the olfactory prints obtained using the detection means, and for comparing the detected impressions with those in the file so that odors may be identified and recognized. Applications, especially to drugs, explosives, body odors and food seals are taught. Column 1 of the patent discusses the various types of sensors available and notes that semiconductive gas sensors must operate at a high temperature, around 350 degrees C. Column 6, line 62 to column 7, line 57 teach at least one temperature sensor and humidity sensor, are placed in at least one of the enclosures to measure the temperature and the humidity of the gas flow. The temperature and humidity level parameters influence the measurements of the piezo-electrical and/or electrical properties of the gas sensors. It is therefore necessary to know the values of these parameters to perform comparisons of the odorous substances. The set of gas sensors,

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temperature sensor and humidity sensor are connected to measurement electronics enabling the steps of testing and measuring the electrical and/or piezo-electrical properties of the gas sensors with or without odorous substances and measuring the temperature and humidity of the gas flow. The data is furnished by the choice of the sensitive parts equipping the sensors, notably the choice of polymer for the conductive-polymer sensors and the surface-acoustic-wave sensors based on the needs of the user of the apparatus. For the semiconductive sensors, the data is furnished by the choice of the type of metallic oxide as well as the choice of their respective operating temperatures, according to the needs of the user. The temperature can be regulated independently for each semiconductive sensor by the measurement electronics, during the stage of testing the electrical properties, in order to determine an optimal range of usage of the sensors.

In the paper Moy discusses transient signal modeling for fast odor classification. The Fox 2000 is an electronic nose system using an array of 6, 12, or 18 gas sensors. The analysis of sensor signals coming from a combination of metal oxide sensors and conducting polymer elements indicates the ability of predicting in only a few seconds the nature of a sample (hams, sausages, cereals...) from its olfactory fingerprint. The simulation of the signals is performed via exponential functions and applied to various foodstuffs. Online and real time Artificial Neural Network (ANN) have also been investigated for fast odor classification and recognition. Six different brands of sausages (pure pork, beef/pork sausages) have been analyzed using a 6-element array. Six samples of each type of sausage were measured 12 times and discriminant analysis was performed over the set of 72 samples using the raw data of acquisition. 94% of the samples were correctly classified and cross validation (testing unknown samples) gave an overall success rate of 83% correctly classified samples. These results indicate the possibility to use electronic noses and pattern recognition methods for fast odor classifications.

In the published application Persaud teaches gas sensors. A sensor for gases, vapors, or odors has an organic polymeric semiconductor element which changes its electrical resistance in the presence of certain gases. The polymer is formed by electrolytic deposition on the substrate from a solution of its monomer, the solution comprising a solvent medium in which the monomer is sparingly soluble, a protic solvent, and an ionic base. A number of different gas detectors can be used to obtain from each a characteristic response to the presence of a gas, and the combination of responses can be used to distinguish between gases. The different detectors

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may be all based upon organic polymers, or one or more detectors may use other principles such as flame ionization or gas chromatography. The sensor is useful in monitoring industrial environments, gas liquid chromatography, quality control in food and drinks production, and food production. Page 14, line 2-9 teach that the different types of sensors can allow the device to detect between odors that it might not otherwise be able to discriminate. Page 16, lines 15-21 teach that an alternative form of the sensor is as a polymer coated field effect transistor.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate other types of sensors such as the metal oxide and/or surface acoustic wave devices taught by Breheret, Mifsud, Moy or Persaud into the Gibson device because of the ability to use them in combination with conducting polymer sensors to discriminate odors that would not easily be discriminated by a single type of sensor as taught by Breheret, Mifsud, Moy or Persaud or in the review of Barisci. It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a temperature controller into the Gibson device because of the need for sensors such as the semiconductor sensors of Breheret and Mifsud to operate at an elevated temperature for sensitivity as taught by Breheret and Mifsud.

#### NEW GROUND OF REJECTION

Claims 98-110, 112-123 and 126-159 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-31 of U.S. Patent No. 6,631,333. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims are of a scope that totally encompasses the patented claims. Thus, one could not practice the patented claims without infringing the instant claims.

#### **(10) Response to Argument**

Relative to the scope being claimed, most of the arguments of Appellant are directed to claim 98. In this respect examiner also points to claims 104-105 being possibly somewhat narrower in the scope of the alternating regions of the two conductive materials, but broader in the scope of the material group that can make up the compositionally different conductive material. Thus, where the references are applicable to this broader scope, examiner will

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reference these claims. It is additionally noted that claim 127 is the broadest scope of those claims that require a plurality of sensors.

With respect to the figures submitted with the Appeal Brief examiner maintains that there are problems with the representations shown in figures 1-2. First figure 1 appears to show the regions as regular stacked separate alternating regions rather than the random regions that exist unless Appellant has used some technique to produce regular regions. The regions of figure 1 appear to have been produced by a method as found in the cited Iyoda reference. Appellant points to page 44, lines 1-13 as providing support, however an expanded look at that paragraph, page 43, line 14 to page 44, line 13, clearly shows that the elements referred to in the section on page 44 are sensor elements not the alternating regions of the conductive organic material and the compositionally different conductive material of the claims. Furthermore, page 38 lines 5-7 teach that the chemiresistors can be fabricated by techniques that would not produce regular layered regions as shown in figure 1. These techniques include solution casting, suspension casting and mechanical mixing. Second, the Barisci figure 2 is a more general depiction of the structure used to make the amperometric measurements. This structure is consistent with the structure described in the secondary references using amperometric detection. Since Appellant has not provided a cite for the basis of their structure of figure 2 or shown how the descriptions in the applied references are equivalent to that structure, the Barisci reference structure is the appropriate one to consider with respect to the instantly applied references. Relative to the Barisci structure being the structure of the references, examiner points at least to the Casella and Yamato references to show the equivalence of the Barisci structure with the applied references using amperometric detection. On page 319 under the electrode preparation section Casella teaches the preparation of the polymer electrode by electrodepositing a film of the polyaniline on the glassy carbon (GC) electrode. This description does not teach the formation of a combination electrode in which a membrane acts as the interface between the sample and an electrolyte containing cell. The flow through cell described has three separate electrodes that contact the sample flowing therethrough. On page 232 of the Yamato reference a similar three electrode configuration is described in the measurements section. More importantly the glucose being measured was injected into the electrochemical cell. Thus in this reference also the analyte contacts all three electrodes in the cell. Thus Appellant's statement in the second full paragraph

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of page 5 of the Brief that the analyte does not come into direct contact with the sensor, is not consistent with the structure or descriptions of these references. However the Barisci structure is fully consistent with these references. It is noted that Appellant does not cite any basis for the statements made regarding the desirability of the sensing materials in an amperometric-electrometric sensor to not change conductivity or remain "invisible" during the analysis in the first full paragraph of page 6 of the Brief. Nor is there any basis given for these statements on pages 8 of the Brief. Therefore these statements are not supported by any art or probative evidence and constitute attorney arguments (see *In re Schulze*, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965) and *In re Geisler*, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997)). In this respect examiner also points to scheme 1 of the Thackeray reference which clearly shows the change in conductivity as a function of the redox state of the sensing material. Thus the references themselves point to the redox changes affecting the conductivity of the sensing material in contradiction to the above attorney argument.

With respect to the argument on page 7 of the brief that the Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi and Wampler references do not teach materials that are sensitive to known analyte gases, examiner replies that the instant claims do not require the sensitive materials to be sensitive to any particular gas (see claims 98 or 127 for example). Thus there is no requirement for the sensitive layer to be sensitive to any particular analyte gas. Furthermore as taught by Barisci and shown by Thackeray, one of ordinary skill in the art would have recognized that a change in redox state would generally be accompanied by a change in the conductivity or resistivity. Thus these references are particularly pertinent to the question of how do the properties of these composite materials vary when compared to the single materials. In this respect there is a clear indication in Barisci that the redox changes of the amperometric sensor materials would have been expected to result in a corresponding change in the conductivity of the materials. Since this is that basis of the conductometric/ resistometric detection methods also discussed by Barisci, one would have expected a corresponding ability to detect the changes by this method also. This is part of the basis of the combinations and motivation used to make the instant combinations. Contrary to Appellant assertion (pages 7-8 of the brief), this does meet the requirements for a *prima facie* case of obviousness in that there is both suggestion and motivation in the references as explained below to make the proposed

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combinations. Also contrary to Appellant's assertion that the combination requires one to discard the fundamental principles of the amperometric-electrochemical sensors, the Barisci reference shows that changes in the sensing polymer properties due to an interaction with an analyte are detectable by the measurement methods of both the amperometric and conductometric types of detectors: at least changes in redox of the polymer are also associated with changes in the conductivity of the polymer. Relative to the alleged teaching away by the Breheret and Mifsud references, examiner responds that Appellant has not limited the type of gases being sensed, the Gibson reference is clearly directed to sensing gases and although the Breheret and Mifsud references might teach that a particular gas or gas mixture can be better sensed by a different kind of sensor, it does not teach that the materials do not have sensitivity to other gases or the gas being sensed. It is also noted that these references are only applied relative to the claims that require additional structure (temperature control or sensors that go beyond the structure required by claims 98 and 104-105). Additionally, the instant rejections do not change the operational principle of the Gibson reference, they modify the sensing material to incorporate conductive particles or other conductive materials within the claimed scope of the compositionally different conductive materials required by the claims. In response to Appellant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Relative to the Gibson reference, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Relative to the use of the term blends on page 13, lines 10-11 of the Gibson reference, it is noted that Gibson teaches "co-polymers and blends of the above compounds may be employed." If co-polymers and blends are the same thing then there is no reason for Gibson to use both. Furthermore the instant specification has multiple examples of using the terms "blending" or "blends" in which the apparent meaning is simply a mixture formed without a

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reaction occurring (see page 25, lines 14-16; page 26, lines 5-10; page 27, lines 19-20; *page 37, lines 8-11*; page 39, lines 14-19; page 40, lines 10-12). Thus it appears that Appellant is trying to interpret or argue that the same terminology used by another (Gibson) means something different than what the instant specification is using as the meaning of “blends”. Also relative to the compositionally different conductive material examiner points to claims 104-105 to show that at least some of the claims include materials other than those found in claim 98. Thus the argument in the second full paragraph of page 11 of the brief is not commensurate with the scope of the claims.

As noted above for the arguments directed solely at the Gibson reference, the comments directed only at the combination of Gibson with Barisci are not persuasive since they are not directed to the combination of references applied. Specifically examiner is not rejecting any of the claims solely based on a combination of Gibson in view of Barisci. The arguments will be discussed to the extent that they deal with Barisci reference teaching a connection between the Gibson and other secondary references. First, on page 307 the first paragraph under the current-measuring techniques heading teaches the following: “as the analyte interacts with the electrode surface it can modify the current flow as a function of applied potential in three (perhaps four – see conductometric/resistometric techniques) ways”. Thus, the current measuring techniques section of the Barisci reference is pointing to a change caused by the interaction with an analyte being measurable by both measurement techniques. In other words current measuring methods such as the amperometric methods can measure changes in the polymers that are also measurable by the conductometric/resistometric measurement techniques. In the third full paragraph under the conductometric/resistometric techniques heading the ability of the changes that are measured by the conductometric/resistometric techniques to also affect the current flow is clearly stated. It is also clear from this section that what is being measured is the changes in the conductivity of the materials. Hence, a change in an amperometric measuring technique that also produces a change in the conductivity of the material is clear evidence that would have been understood by one of ordinary skill in the art as a connection showing that changes in the polymer materials leading to changes measurable by the amperometric method also lead to an expectation that the same changes can be measured through the conductometric/resistometric measuring method. In this respect the second paragraph of page 309 teaches that overoxidized polypyrrole is known to

be less conductive. Thus a change in the oxidation state of the polypyrrole (measurable by an amperometric technique) leads to a change in conductivity that is also measurable by the conductometric/resistometric techniques. Polypyrrole is again used as the conducting polymer example in the second full paragraph of the gas sensors section on page 310. In this paragraph the interaction (reaction) between the polymer and analytes nitrogen dioxide and hydrogen sulfide is characterized as oxidation or reduction. This is explained as causing a change “reflected in the increase in resistance that occurs in the presence of  $\text{H}_2\text{S}$  and the decrease in resistance observed with  $\text{NO}_2$ .” This connection between the oxidation and/or reduction of the polymer (a change measurable by a current measuring technique) and a change in the resistance of the material (measurable by a conductometric/resistometric technique) could not be more clearly stated. **Thus Barisci gives a clear teaching that a change measurable by electrochemical techniques is associated with a property change that is also measurable as a change in the resistance in the “sensing area”.** This clearly contradicts Appellant’s position regarding Barisci as found in the Appeal Brief and supports the position of examiner. Barisci does show the connection between the teachings of Gibson and the other applied secondary references. This is applicable to all of the other secondary references and thus will not be directly dealt with in the discussion of the other applied references hereinafter. Thus in the comments which follow examiner will deal with the teachings of the other secondary references that show the benefits of modifying the sensing materials of Gibson with the teachings of those references and respond to the arguments put forth by Appellant toward the combinations set forth in the rejection of examiner.

Relative to the combination of Gibson, Barisci and Casella examiner notes that in the last paragraph of the left column of page 218, Casella discusses the prior characterization of the PANi films in acidic and neutral media in which the polymer is electroactive (conductive). They are investigating the polymer in alkaline media in which the film is an insulator (non-conducting). In figure 1 and its associated description in the paragraph bridging pages 219-220, curve 1c shows the behavior of a polyaniline (PANi) film in alkaline media and teaches that this is due to the polymer being in the neutralized free-base form. This appears to be what is meant by the polymer is inert as found in the conclusion of the paper. The paragraph bridging the columns of page 221 is clear that the electrode interacts (reacts with hydroxide) with the analyte.

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The paper also is silent on if this interaction changes the redox properties of the material. Thus the paper does not teach away from the combination. In spite of this characteristic of the polymer alone, adding the metal particles produces a measurable change in the current. It is also clear from the discussion that the polymer is electroactive (conductive) in acidic environments. The Casella reference shows that the incorporation of the copper particles allows the current to be measured, provides some conductivity, even when the polymer is not very conductive. This reference is also clear that the stability of the polymer is enhanced (see pages 218 and 224). With the Casella reference, this would also provide a motivation for adding the metal particles when the sensor is used in an acidic or neutral environment that it acts as a conductive material.

Relative to the combination of Gibson, Barisci and Thackeray, examiner first points to scheme 1 on page 6674. In the figures shown it is clear that the gases, oxygen and hydrogen interact with the polymer to form a material that is reduced (insulating) or oxidized (conducting). This clearly shows that the polymer is not invisible as alleged by Appellant. The first paragraph of this paper discusses the reaction and its ability to turn "on" or "off". There is a clear statement that because of the various properties of the chemically sensitive device, it is an ideal candidate for microsensor development. Relative to the reference calling the metal particles a catalyst, examiner notes that the manner in which the compositionally different conducting material functions in the instant claims is not specified. Thus, this argument is not commensurate with the claims. Additionally the fact that the reference clearly teaches the formation of conducting and non-conducting states of the polymer based on its redox state shows that the metal particles are clearly capable of assisting in interacting with an analyte to form a polymer that changes in its conductive/resistive properties which are clearly measurable in sensors taught by Gibson. It is also noted that although the language of wherein the sensing area is in direct contact with a vapor comprising an analyte to be detected is in the language of claim 98 at least, this language because of its open scope, does not limit the claim to contact with a gaseous environment only. Furthermore, Gibson is the primary reference that is being modified, not Thackeray. Gibson clearly has the sensing area in contact with a gaseous environment and the teachings of Thackeray do not change that aspect of Gibson. Therefore, Thackeray shows that the inclusion of metal particles in the Gibson polymer would have had various expected beneficial properties and may even enhance the way in which the changes in conductivity of the Gibson polymers can

occur. In the sections pointed out by Appellant on page 6679, it is noted that what Appellant left out of the statements was that the conductivity of the polymer is what varies and is likely to be somewhat electrolyte dependent. Thus in the sections referred to by Appellant, it is clear that it is the conductivity of the polymer that varies and is dependent upon what the polymer is contacting.

Relative to the combination of Gibson, Barisci and Yamato, examiner notes as above Appellant does not limit the claims to any particular method of interacting with the analyte. And in particular the claims do not exclude the provision of an enzyme on the membrane. Thus these arguments are not commensurate in scope with the claims. It is also noted that in the section referred to by Appellant, Yamato clearly states that the glucose was injected into the electrolyte thus contacting the polymer electrode.

Relative to the combination of Gibson, Barisci and Naarmann examiner points to claim 104 as evidence that the instant claims include the scope of an organic conductor/organic conducting polymer. Instant table 2 includes a listing of the various types of conductors that are included in the scope of conductors as set forth in the claims. In the organic conductors section of the table, the instant specification lists charge transfer complexes of which the last listed is tetrathiofulvalene complexes. Examiner asserts that this is equivalent to the tetra:thia:fulvalene in the title of the English language abstract. For this reason Naarmann does contain an organic conductor as found in the Markush group of the claims. Thus the Naarmann reference is also relevant to the instant claims as explained above relative to the use of an electrochemical sensor to modify a chemoresistive sensor.

Relative to the combination of Gibson, Barisci and Li examiner points out that the metal used in Li is different from that used in Casella. Therefore, Li represents a different type of inorganic conductor. Additionally the abstract of Li clearly states that the finding of Li is particularly important for developing layers for chemical sensors. There is no limitation on this statement to amperometric chemical sensors, which shows the scope of application that Li intended the results shown to be considered or have relevance. Scheme I and its description, clearly show how the oxidation state of the PANi film is changed by the action of the metal present and that this changes the conductivity of the polymer.

Relative to the combination of Gibson, Barisci and Sakaguchi examiner again points to table 2 of the instant specification for the examples of a mixed inorganic/organic conductor. Examiner asserts that the polymer taught by Sakaguchi is included in this type of compositionally different conducting material as found in claim 104. This reference also teaches the inclusion of a non-conducting polymer in the sensing composition. The benefit of this type of composition would be in its long life.

Relative to the combination of Gibson, Barisci and Stetter, examiner points to this reference showing the use of either conductive carbon particles (carbon black or its equivalent) and metal particles in a chemoresistive sensor (see abstract and column 3, lines 5-14).

Relative to the combination of Gibson, Barisci and Wampler examiner points to the first paragraph of the introduction on page 1811. In this paragraph the production of polypyrrole/carbon black materials by electrosynthesis is discussed. The electrosynthesis approach offers a convenient way of immobilizing a composite coating onto a suitable electrode support. This configuration is taught as suited to a number of potential applications including sensors. Wampler does not limit this statement to any particular type of sensor. This method of producing these materials is taught as having two handicaps related to characterization of the materials. In the second paragraph of the introduction, the application of electronically conducting polymers such as polypyrrole and polyaniline in sensors and environmental remediation is taught. Thus Wampler teaches and recognizes that these polymers are used for a wide variety of applications and the teachings of Wampler show the scope of applicability of the conducting polymers. Furthermore this shows that the properties of these materials would have been recognized as having applicability to chemical sensors as well as the exemplified remediation application. Thus, the combination is not a hindsight combination as there are clear teachings of applicability to other applications besides the one exemplified. Thus one of ordinary skill in the art would have expected the enhancement of material properties taught by Wampler to be obtained by a similar inclusion of carbon black in the sensing materials of Gibson.

Relative to the addition of Breheret, Mifsud, Moy and Persaud to the above discussed combinations examiner agrees that these additional references do not teach one how to modify the Gibson sensing materials to meet the instantly claimed sensing materials in claims such as 98

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and 104-105. However, since the above combinations do teach the obviousness of the inclusion of the compositionally different conducting material into the Gibson sensing materials without the addition of Breheret, Mifsud, Moy and Persaud, these references are not required to show the obviousness of those deficiencies of the Gibson sensing materials. The requirements of claims 114, 116, 136, 138 and 158 that are not taught by Gibson are the temperature control and the provision of other sensors that are different in their sensing layer or method of sensing the analytes. The obviousness of this is clearly taught by the Breheret, Mifsud, Moy and Persaud references and Appellant has not challenged this in the arguments of the Brief.

Relative to the alleged unexpected result, examiner believes that Appellant has not compared the instant invention to the closest prior art. In this respect, examiner asks what is the closest prior art to the instantly claimed conducting polymer having added thereto a second, different conducting material? Is it a sensing composition having a non-conducting polymer to which a conducting material has been added to the point that the composition becomes conducting or is it the conducting polymer of the instant invention without the additional conducting material present? Since the conducting polymer is conductive prior to addition of the additional conductive material, examiner asserts that this is closer prior art to the instant invention than the non-conducting material made conductive by addition of a conductive materials asserted by Appellant. For this reason examiner submits that the closes prior art is actually a sensor using the conducting polymer alone such as the Gibson reference, rather than the non-conducting polymer made conducting by the inclusion of conducting particles. It is on this basis that examiner takes the position that Appellant has not made the proper comparison to assert unexpected results. Furthermore, if the comparison of examiner was made, a real comparison between the advantages and benefits taught by the instantly applied Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi, Stetter and Wampler references cold be made with regard to any unexpected results. Additionally, the number of comparisons in the applied prior art between the conducting polymer alone and the conducting polymer with added conductor would point to examiner's position being the one that would have been accepted by those of skill in the art for a comparison between the closest prior art and the instant claims rather than the choice made by Appellant in the instant specification. Thus Appellant's assertion

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of unexpected results is not based on the closest prior art and carries little if any patentable moment contrary to the argument of Appellant.

For the above reasons, it is believed that the rejections should be sustained.

This examiner's answer contains a new ground of rejection set forth in section (9) above. Accordingly, Appellant must within **TWO MONTHS** from the date of this answer exercise one of the following two options to avoid *sua sponte* **dismissal of the appeal** as to the claims subject to the new ground of rejection:

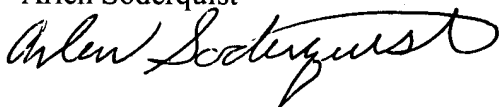
(1) **Reopen prosecution.** Request that prosecution be reopened before the primary examiner by filing a reply under 37 CFR 1.111 with or without amendment, affidavit or other evidence. Any amendment, affidavit or other evidence must be relevant to the new grounds of rejection. A request that complies with 37 CFR 41.39(b)(1) will be entered and considered. Any request that prosecution be reopened will be treated as a request to withdraw the appeal.

(2) **Maintain appeal.** Request that the appeal be maintained by filing a reply brief as set forth in 37 CFR 41.41. Such a reply brief must address each new ground of rejection as set forth in 37 CFR 41.37(c)(1)(vii) and should be in compliance with the other requirements of 37 CFR 41.37(c). If a reply brief filed pursuant to 37 CFR 41.39(b)(2) is accompanied by any amendment, affidavit or other evidence, it shall be treated as a request that prosecution be reopened before the primary examiner under 37 CFR 41.39(b)(1).

Extensions of time under 37 CFR 1.136(a) are not applicable to the TWO MONTH time period set forth above. See 37 CFR 1.136(b) for extensions of time to reply for patent applications and 37 CFR 1.550(c) for extensions of time to reply for ex parte reexamination proceedings.

Respectfully submitted,

Arlen Soderquist




A Technology Center Director or designee must personally approve the new ground(s) of rejection set forth in section (9) above by signing below:



GREGORY MILLS  
QUALITY ASSURANCE SPECIALIST

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Conferees:

  
Jill Warden  
Supervisory Patent Examiner  
Technology Center 1700

  
ROY KING  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700